

Portland Harbor RI/FS - FS Process Outline

- 1) Develop RAOs (Section 4.2.1 of RI/FS Guidance)
 - a. Refine RAOs based on preliminary RAOs presented in Programmatic Work Plan
 - i. Metrics (e.g., reduce lifetime excess cancer risk to 10^{-6} or reduce tissue concentrations to achieve TRV)
 - b. Develop and refine PRGs
 - i. Baseline risk assessment
 - ii. Chemical specific ARARs
 - iii. Identify range of PRGs to carry forward into FS
- 2) Develop General Response Actions (Section 4.2.2 of RI/FS Guidance)
 - a. Dredging
 - b. Capping
 - c. MNR
- 3) Identify AOPCs (Section 4.2.3 of RI/FS Guidance)
 - i. Spatial distribution of contamination
 - ii. Exposure areas for various receptors
 - iii. Application of Geo-statistical tools (e.g., Thiessen polygons, risk contouring, other)
 - iv. Evaluation of subsurface contamination (e.g., erosion potential)
- 4) Initial Technology Screen – Site-wide (Section 4.2.4 of RI/FS Guidance)
 - a. Technologies
 - i. Dredging (hydraulic, clamshell, environmental bucket)
 - ii. Capping (amendments, armoring, thin layer, habitat enhancements)
 - iii. Containment (sheet pile, silt curtains, bubble curtains)
 - iv. Disposal (CDF, CAD, upland, offsite)
 - v. Treatment (dewatering, beneficial re-use of material)
 - vi. Monitored natural recovery (degradation, dilution)
 - vii. Institutional controls (fish advisories, navigation restrictions)
 - b. Evaluation
 - i. Effectiveness (chemicals, site specific factors)
 - ii. Cost (range for each)
 - iii. Implementability (equipment availability)
- 5) SMA Identification and Optimization (Section 4.2.5, 4.2.6 and 4.3 of RI/FS Guidance)
 - a. Factors:
 - i. Physical Parameters
 1. Sediment characteristics
 2. Potential for deposition and/or scour
 3. River depth
 4. Current velocities
 5. Proximity to navigation channel
 6. Level of activity (e.g., shipping activity)

- ii. Chemical Parameters
 - 1. Risk drivers
 - 2. Leachability
 - 3. Organic carbon content
 - 4. Bioavailability
 - 5. Presence of NAPL and/or dissolved phase contaminants
- iii. Site Factors:
 - 1. Release mechanism (e.g., overwater release, upland NAPL release, stormwater discharge, bank erosion)
 - 2. Geographic location (where does it make sense to group SMAs based on geographic proximity?)
 - 3. Current site use
 - 4. Potential for future dredging activities
 - 5. Habitat potential
 - 6. Navigation requirements
 - 7. Future site use and development potential
- b. SMA Identification –
 - i. Identify area requiring active remediation through “hilltopping” or similar techniques
 - ii. Develop remedial action levels for each SMA focusing on key risk drivers
 - iii. Group according to geographic proximity and SMA specific characteristics
- c. SMA Optimization – Screening Level evaluation based on SMA characteristics (Example Only)
 - i. Dredging emphasis:
 - 1. Identify SMAs where dredging is likely to be the primary remediation technology
 - 2. Estimate the areal and vertical extent of dredging based on application of site-wide technology screen and SMA specific factors
 - 3. Evaluate the feasibility of various treatment options for dredged material based on application of site-wide technology screen and SMA specific factors
 - 4. Evaluate the feasibility of various disposal options for dredged material based on application of site-wide technology screen and SMA specific factors
 - 5. Determine whether post dredging cap placement is required and nature of post dredging cap
 - 6. Identify areas outside dredge area subject to capping and MNR
 - 7. Evaluate effectiveness of capping and MNR based on consideration of factors identified below
 - 8. Evaluate effectiveness of overall SMA remedy at reducing risk through residual risk assessment including time-frame for reducing risk
 - 9. Evaluate need for institutional controls
 - ii. Capping emphasis
 - 1. Identify SMAs where capping is likely to be the primary remediation technology

2. Determine the areal extent of capping based on application of site-wide technology screen and SMA specific factors
 3. Determine whether dredging is required prior to cap placement based on application of technology screen and SMA specific factors
 4. Identify key cap parameters (e.g., thickness, cap type, need for cap amendments) based on application of site-wide technology screen and SMA specific factors
 5. Identify Areas outside cap area subject to MNR
 6. Evaluate effectiveness of MNR based on consideration of factors identified below
 7. Evaluate effectiveness of overall SMA remedy at reducing risk through residual risk assessment including time-frame for reducing risk
 8. Evaluate need for institutional controls
 - iii. MNR emphasis
 1. Identify SMAs where MNR is likely to be the primary remediation technology
 2. Determine whether source reduction through capping and/or dredging is required based on application of site-wide technology screen and SMA specific factors
 3. Identify time-frame and monitoring requirements for MNR based on application of technology screen and SMA specific factors
 4. Evaluate effectiveness of overall SMA remedy at reducing risk through residual risk assessment including time-frame for reducing risk
 5. Evaluate need for institutional controls
- 6) Detailed Evaluation of Remedial Action Alternatives on Site-Wide Basis (Section 6 of RI/FS Guidance):
- a. Develop a suite of site-wide remedial action alternatives
 - i. Develop and present SMA “groupings”
 - ii. Identify areas subject to Dredging, Capping and MNR
 - iii. No-action alternative
 - b. Evaluate overall protection of human health
 - c. Evaluate compliance with ARARs
 - d. Evaluate Long-Term Effectiveness considering:
 - i. Effectiveness and schedule for source control efforts
 - ii. Recontamination potential analysis
 - iii. Effectiveness of monitored natural recovery to reduce contaminant concentrations over time
 - iv. Long-term reliability and stability of sediment caps
 - v. Time-frame to achieve protective levels
 - e. Reduction of toxicity, mobility and volume through treatment
 - i. Application of in-situ and/or ex-situ treatment technologies
 - f. Short-term effectiveness considering
 - i. The potential for releases during dredging and capping activities

- ii. The effectiveness of containment technologies such as silt curtains and sheet piling
 - iii. Duration of remedial activities
 - iv. Time until protection is achieved
- g. Implementability
 - i. Flood rise
 - ii. Availability and capacity of disposal sites
 - iii. Compatibility with existing and likely future land use including site redevelopment, river use, habitat areas and potential restoration sites
 - iv. Prioritization and sequencing
 - v. Performance measures and monitoring
- h. Cost
 - i. Capital costs
 - ii. Operation and maintenance costs
 - iii. Mitigation